What Is Wrong With This Picture?

FIND 7 WAYS AQUATIC EXOTICS ARE SPREAD.

WISCONSIN AQUATIC INVASIVE SPECIES (AIS)

Poster Lesson

Target Age Group **2nd - 5th grade**
Approximate Time - **1 hour**

Objectives:

1. Define the term "invasive species."
2. Identify three aquatic invasive species present in Wisconsin.
3. Describe impacts of aquatic invasive species on Wisconsin waters.
4. Explain advantages aquatic invasive species have over native species that allow them to take over.
5. Identify three ways to prevent the spread of aquatic invasive species.

Materials:

Introduction to Aquatic Invasive Species

- Computer
- Internet Access
- Projector

Project WET Invaders! *(The Activity- Parts 1 and 2, see activity below)*

- Carpet squares or chairs (number of students in class; you can also use chalk and draw squares on pavement if playing outside)
- Two cards with the word "Predator" (cards can be laminated and put on a string or attached to students' upper back with a clothespin)
- Strips of red and green paper (see activity)
- Chalkboard, dry erase board, or large piece of butcher paper for graphing
- Red and green markers

Closing Activity *Preventing the Spread of AIS*

- Laminated Sea Grant AIS Posters (back of this lesson)
- Dry Erase Markers
- Picture of WI AIS Boat Landing sign (visit **dnr.wi.gov** and search for "AIS sign")

Optional: AIS Specimens (if available)
AIS Wildcards/Watchcards
Stop Aquatic Hitchhikers Stickers
Stop Aquatic Hitchhikers Brochures
AIS tattoos

AIS wildcards, brochures, stickers, tattoos and posters are available free of charge from the Wisconsin Dept. of Natural Resources, please send an e-mail to *AISinfo@wisconsin.gov* to request a supply.

Introduction to Aquatic Invasive Species

1. Start off by asking the students "How many of you have visited a lake or river?" and "What do you like to do at the lake/river?"
2. Continue discussion by asking the students "Why is it important to protect our lakes and rivers?" and "What can you do to keep our lakes and rivers clean so we can continue to enjoy them?"
3. Now tell them that they have a very important job to do to protect our waters. There are new things called "invasive species" that most of their parents didn't learn about in school that can really ruin our lakes and rivers. Ask students if any of them know what they are or have heard of any and bring up well known AIS such as zebra mussels, Eurasian water milfoil, purple loosestrife, etc. Background information available on the Wisconsin Dept. of Natural Resources web site: **type "*Invasives*" in the search box.**

Invasive species are non-native species (plants, animals, or pathogens) that rapidly take over a new location and alter the ecosystem.
Kid friendly definition for invasive species: Animals and plants that aren't naturally found in an area and take over. Fish like walleye or butterfly mussels are natural to WI lakes; these are called "native species". They are originally from this area; it's their home. The problem with invasive species is that they steal food from native species and take over our lakes. How would you like it if a stranger came into your house and stole your breakfast every day? Invasives come in and outcompete for food and all the things animals and plants need to grow big and strong. They also mess up our lakes. Invasive plants like Eurasian water milfoil grow so big that they make it really hard to swim, and they get all tangled up in our fishing line and boat motors. Zebra mussels can grow so out of control that they can attach to and clog pipes; their shells also collect on our beaches and can cut our feet.

4. Play a short clip from the DNR kid's TV show "Into the Outdoors-Derailing Aquatic Hitchhikers". Visit **dnr.wi.gov** and search for "invasive videos". Play first segment (7 minutes 30 seconds) or more if time allows.
5. Play the game Invaders! (The Activity Parts 1 and 2- Project WET Activity Invaders! from the 2011 Project WET Curriculum and Activity Guide, Generation 2.0) to simulate how invasives can outcompete for food and resources.

Project WET Invaders! (See Lesson Plan below)

Closing Activity Preventing the Spread of AIS

1. Review what they learned about AIS in the **Introduction to AIS** and during the Invaders! Activity. Now let them know that there are ways we can prevent their spread to our precious waters.
2. Arrange the students into groups of 3-4 and hand out one laminated Seagrant AIS poster to each group along with a dry erase marker.
3. Have each group review the poster and think about how AIS can spread. Direct students to circle all the actions in the poster that may cause the spread of AIS. (See key for answers)
4. Have students share all the ways they discovered that AIS can spread.
5. Now create a list of ways students can help prevent the spread of AIS to their precious lakes and rivers and write them on the board.
   - Remove weeds, mud, and animals off boats, motors, and trailers.
   - Drain water from boats or containers with fish (invasives like to hitch a ride on boats, equipment, and water and move with you to another lake/river)
   - Clean off any equipment you use when at the lake/river (fishing poles, lines, waders, SCUBA gear, etc)
   - Don't dump bait into the lake; throw it in the trash
   - Don't release aquarium pets or plants into a lake or river
   - Learn which species are invasive in Wisconsin and don't buy them (visit the **dnr.wi.gov** and search for "NR 40")
6. Leave the students with a task, ***"We're relying on all of you to make sure you follow these rules and help us protect the lakes and rivers we love to play in. Do you think you can do that?"***
7. Provide students with some AIS wildcards, brochures, and tattoos and ask them to share what they learned with their parents. Remind them that now it's their turn to be the teacher and teach their family about how they can help stop the spread of invasive species.

INVADERS!

What would you do if your home was taken over by invited and uninvited guests who refused to leave?

Grade Level
Upper Elementary School, Middle School, High School

Subject Areas
Life Science, Environmental Science, Ecology

Duration
Preparation time: Warm Up: 10 minutes; Part I: 10 minutes; Part II: 5 minutes; Part III: 10 minutes
Activity time: Warm Up: 10 minutes; Part I: 10 minutes; Part II: 5 minutes; Part III: 10 minutes

Setting
Outdoor and classroom

Skills
Gathering information (observing, researching); Organizing (graphing); Analyzing (identifying components and relationships among components, discussing); Interpreting (summarizing, identifying cause and effect); Applying (hypothesizing); Presenting (reporting)

Charting the Course
An adaptation of "Humpty Dumpty" is ideal for demonstrating how invasive species change ecosystems and how difficult it can be to restore native plants and animals. Invasive species could also be added to "8-4-1, One for All" as a watershed management obstacle and the basis for a discussion on how people are trying to manage invaders.

Vocabulary
Aquatic Invasive Species, lionfish, habitat, ballast, watershed, non-native, ecosystem, native, biodiversity, food chain, predator/prey relationship, riparian, bilge water

SUMMARY
Students will learn what aquatic invasive species are and then participate in a full-body movement game that simulates competition for habitat and resources; students will also create graphs and fi nd out about prevention and management of aquatic invasive species.

Objectives
Students will:
- define the term "aquatic invasive species."
- describe how an aquatic invasive species could be transported between water bodies.
- identify how an aquatic invasive species can impact native species and their natural habitat.
- discuss existing management strategies for controlling aquatic invasive species.
- identify at least three aquatic invasive species within their own state or region.

Materials
Warm Up
- *Lionfish* (one per group)

Part I
- *Carpet squares or chairs* (number of students in class minus two; you can also use chalk and draw squares on playground blacktop or in the dirt) Two cards with word "Predator" (Card can be laminated and put on a string or attached to students' upper back with a clothespin)

Part II
- *Carpet squares or chairs* (number of students in class; you can also use chalk and draw squares on playground blacktop or in the dirt)
- *Strips of green and red paper* (depends on how many rounds are played)
- *Chalkboard, dry erase board or large piece of butcher paper for graphing*
- *Red and green markers*

Part III
- **Aquatic Invasive Species Alert!** (one per group) 3

Making Connections
Students may have heard the term "aquatic invasive species," but they may not know which species are causing problems, understand their impact on native species and habitat or realize how they are transported from one water body to another. Students will learn about specific kinds of aquatic invasive species, how they impact native species and habitat both generally and specifi cally and what they can do to prevent the spread of these invaders.

PROCEDURE

Warm Up
- Define for students the terms aquatic species and aquatic invasive species.
- Tell students that they will be investigating an aquatic invasive species. Provide them the **Student Copy Page –*Lionfish*.**
- After they have had an opportunity to work with the **Student Copy Page**, discuss various scenarios as to how lionfish, which are native to Pacific waters, might have found their way to Atlantic waters. Discuss the threat lionfish pose for aquatic organisms as well as humans.

THE ACTIVITY

Part I

1. Select a playing area about 40 feet on each side. Place chairs or carpet squares within the playing area. If playing outdoors, you can also draw squares in the dirt or with chalk on pavement. Use two fewer squares than there are students.

2. Explain to students that most of them are native animal species. The squares represent habitat which contains everything they need to survive. Only one student (native species) can survive on each square.

3. Assign two students to be "predators" by wearing the "predator" cards. As students seek habitat, "predators" may tag them and put them out of the game and on the sidelines. Once a student is on a habitat square they are "safe" for that round. (For larger groups, more predators may be needed. Remove a square for each predator.)

4. Line up students around the perimeter of the playing area. On your signal, students must find a habitat.

5. The game ends when most students have found a habitat (by standing on a square).

6. Those that do not find habitat (either because there were not enough squares or they were tagged bypredators) do not survive and must go to the sidelines.

7. Ask students, "Was it difficult to find habitat? Did the majority of species survive? What did they observe regarding competition for habitat?"

8. Ask students to write a two-sentence summary of the scenario they enacted. When they are finished, have several students read their summaries. Create a class summary. It should include the following points:
- Native species compete for habitat and resources in the natural world.
- Not all species survive as there may not be sufficient resources or habitat.
- Native species are lost to predation or die from injury or age.

Part II

1. Arrange chairs or squares (one per student) back-to-back in a curving line to represent a stream or river channel (preferred habitat for wetland plants).

2. Tell students they will be playing a game similar to musical chairs. Select three students to be aquatic invasive species and give them each a red strip of paper. Give the remaining students green strips of paper, representing native species.

3. For the first round, there will be enough chairs for all the students to succeed within the environment, whether they are native or an aquatic invasive species. As with musical chairs, when the music is playing, students circle the chairs clockwise. When the music stops, they must find a chair, signifying that they have acquired enough water and habitat resources to survive. When students leave their chairs for the next round, they should leave their strips of paper on their chairs. Tell students that invasive plant species may have a competitive advantage over native species by growing or reproducing more quickly, having fewer predators or other adaptations.

4. After the first round, demonstrate the advantages that the invasives have by allowing the students in the aquatic invasive species group to closely circle the chairs, while all the native plant students must circle at a distance of six feet.

5. In ensuing rounds of the game, the goal is for the native species to find a chair marked with a green strip of paper signifying available habitat and resources, not taken over by invasives. Students already designated as invasives (red) can sit at any chair. If a native species (green) can't find a chair marked with a green strip, they must sit on a spot marked with a red strip; that student becomes a member of the invaders group and gains the advantage of circling the chairs closely during the next round. Once a student becomes invasive they remain invasive throughout the duration of the game and receive a new red strip of paper at every round. If an invasive sits at a chair marked with a green strip that chair then becomes invasive habitat and the green strip is replaced by a red strip. If an invasive sits at a chair already marked with a red strip they can hold on to their red strip to use for the next round. Continue to hand *only* the aquatic invasive species students red strips of paper to mark their chairs, replacing the green strips when they take over (populate) those spots (habitats).

6. At the beginning of each round, count the number of invader students and the number of native plants students. Record these numbers so you can graph them later. As the game progresses, more and more chairs will be taken over by the invasives, leaving less and less habitat for the native plants (as well as the animals, birds and insects that have evolved to depend on those plants). Play enough rounds so that almost all the chairs are taken by aquatic invasive species students.

7. Make a line graph showing the number of non-native and native plants present at the beginning of each round on a dry erase board or large piece of butcher paper (see sample graph). Use a red marker to represent invaders and a green marker to represent native plants. You'll see that the non-native line will start low and rise as the rounds progress, while the native plants will start high and decline.

8. Explain that the data they graphed is similar to the types of data that a biologist would collect and plot. That data can be used in restoration and management efforts. Tell students that aquatic invasive species management will be discussed in ***Part III.***

Part III

1. Ask students if they know what is being done about invasive species. Have they heard of any efforts to control or manage invasive species populations?

2. Have students visit *http://nas.er.usgsgov/queries/StateSearch.asp* and using the "state search" feature find at least three aquatic invasive species in their own state or region. If an Internet search is not possible, students can research local non-native invasive species by contacting the state agency charged with managing AIS.

3. Hand out the Student Copy Page –*Aquatic Invasive Species* and ask students, "What would you need to know to eradicate or control an aquatic invasive species?" Students can research answers in small groups, or the following list can be shared with them after class discussion:
Research information may include:
- The life history of the non-native species.
- The life history of native species sharing the river or basin and impacted by the invader.
- The geographic range of both native and non-native species.
- An exploration of the control methods used by experts – chemical, biological and mechanical.

4. Ask students why extensive research should be conducted before any method is selected. (Chemicals [poisons] may affect native species; introduced predators may feed on native species; anything that is introduced may further disrupt the natural system.)

5. Ask students to return to their small groups. Tell them that they are on a task force responsible for the control of an aquatic invasive species. Provide each group with the Student Copy Page – *Aquatic Invasive Species Alert!*

6. After they have had time to work through the page, discuss group results. Groups can appoint a "spokesperson" to explain their conclusions. Compare results. Are the groups' solutions similar or different?

WRAP UP
- *Ask students if they believe it is possible for an aquatic invasive species to eliminate a native species. How do they think this would impact a natural ecosystem? (There are several examples, but one is the lionfish, which can eat the entire native fish population on coral reefs, including herbivorous fish that control seaweed growth on coral.)*

Project WET Reading Corner

Aronson, Virginia and Allyn Szejko. 2010. *Iguana Invasion! Exotic Pets Gone Wild in Florida*. Sarasota, FL: Pineapple Press, Inc. Who would have suspected that the innocent release of some unwanted pets could contribute to a real disruption in some of Florida's ecosystems?

Batten, Mary. 2003. *Aliens From Earth: When Animals and Plants Invade Other Ecosystems*. Atlanta, GA: Peachtree Publishers, Ltd. The problems of non-native species invading ecosystems can be devastating, expensive and impossible to reverse.

NSTA Staff. 1998. *Introduced Species*. Arlington, VA: National Science Teachers Association. If you have ever seen a field overgrown with kudzu or have seen zebra mussels in an estuary, you know the problems that these non-native species have caused.

ASSESSMENT

Have students:
- identify the term aquatic invasive species **(Warm Up)**.
- describe three ways that an invasive species may be transported between water bodies **(Warm Up)**.
- discuss two ways an aquatic invasive species may disrupt a natural system. **(Part I and Part II)**.
- cite three management strategies to control or eradicate an aquatic invasive species **(Part III)**.
- identify at least one aquatic invasive species within the student's own state or region and how it is being controlled **(Wrap Up)**.

EXTENSIONS

Invite a biologist or other aquatic invasive species expert to discuss aquatic invasive species and management strategies with the class.

TEACHER RESOURCES

Books

Krasny, Marianne E. and the Environmental Inquiry Team. 2003. *Invasion Ecology* (Teacher's Guide). Arlington, VA: National Science Teachers Association.

Journals

Holiday, Susan. 2003. "A Native Species Restoration Project." *Science Scope*, 27 (2), 24-27.

Mason, Kevin, Krista James, Kitrina Carlson and Jean D'Angelo. 2010. "The Invasive Plant Species Education Guide." *The Science Teacher*, 77 (4), 32-36.

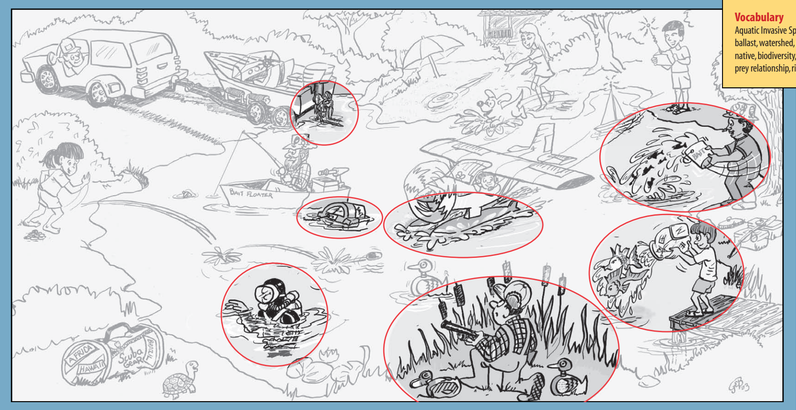
Stracey, Christine. 2008. "Science Sampler: Alien Invaders!" *Science Scope*, 31 (6), 53-57.

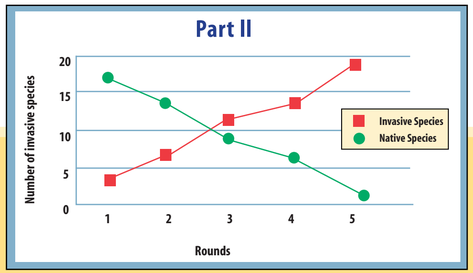
Websites

United States Department of Agriculture. National Invasive Species Information Center. Aquatic Species. This website discusses aquatic invasive species in the U.S. ***www.invasivespeciesinfo.gov/aquatics/main.shtm***l. Accessed May 25, 2011.

United States Department of Agriculture. Natural Resources Conservation Service. Plants Database. This site has listings for native, non-native and invasive plants found in the U.S. ***http://plants.usda.gov/java/***. Accessed May 25, 2011.

ANSWER KEY:





Sea Grant

UW Extension

If you are interested in receiving more activities similar to Invaders!, visit dnr.wi.gov and search "Project WET" to learn how you can attend a Project WET workshop.

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